

# Modified Acoustic Emission for Prognostic Health Monitoring, Phase II

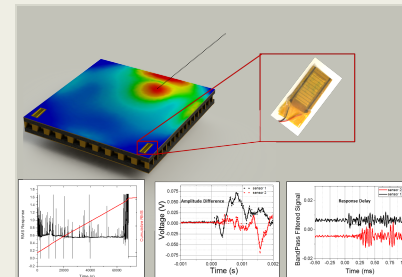
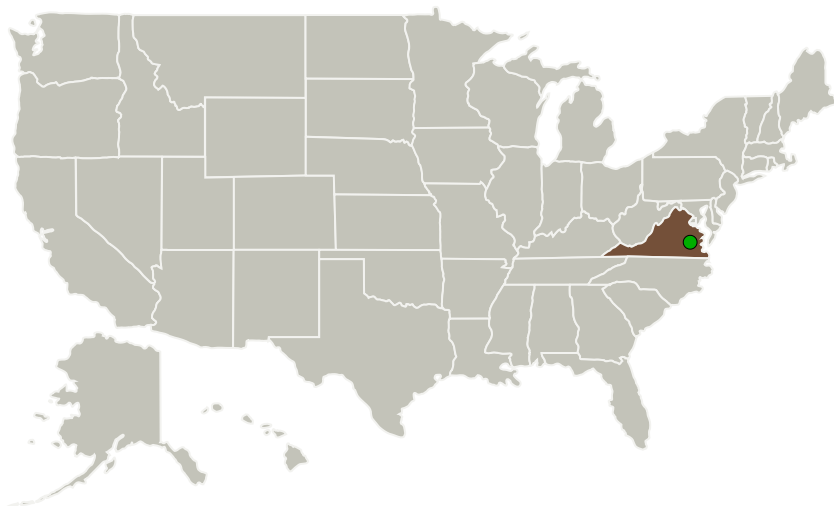
Completed Technology Project (2016 - 2018)



## Project Introduction

Prime Photonics proposes to team with Dr. Duke of Virginia Tech to develop a multi-mode, enhanced piezoelectric acoustic emission sensing system to couple large damage events to local distribution of damage accommodation. Our system will be centered around an instrument designed to accept the output of a piezoelectric transducer sensitive to in-plane acoustic events. The signal processing path will not only monitor high energy acoustic emission events to detect impact events, but also transitions in the background power spectral density of the acoustic emission events, and real time strain. The system will be designed to operate with macro fiber composite (MFCs) sensors to provide the simultaneous AE and strain detection, but will also accept as inputs traditional isometric type transducers. Augmentation of background acoustic energy transition states with temporal and spatial information about impact and strain enables unprecedented non-destructive evaluation capabilities to enable semi-autonomous structural health monitoring of systems and components.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Prime Photonics, LC	Lead Organization	Industry	Blacksburg, Virginia
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia
Virginia Polytechnic Institute and State University(VA Tech)	Supporting Organization	Academia	Blacksburg, Virginia

## Primary U.S. Work Locations

Virginia

## Project Transitions

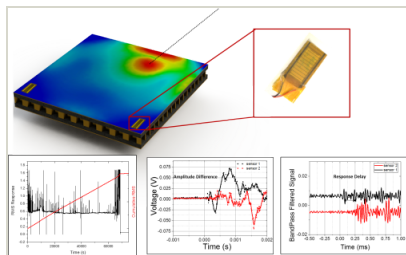
▶ **September 2016:** Project Start

✓ **December 2018:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140794>)

## Images



## Briefing Chart Image

Modified Acoustic Emission for Prognostic Health Monitoring, Phase II  
(<https://techport.nasa.gov/image/131854>)



## Final Summary Chart Image

Modified Acoustic Emission for Prognostic Health Monitoring, Phase II  
(<https://techport.nasa.gov/image/131247>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Prime Photonics, LC

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

Carlos Torrez

## Principal Investigator:

Melissa Natwick

## Co-Investigator:

David K Gray

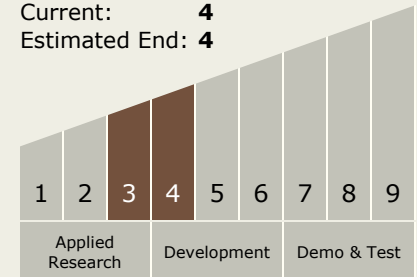
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## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



## Technology Areas

### Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - └ TX12.4 Manufacturing
    - └ TX12.4.5 Nondestructive Evaluation and Sensors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System